

Republic of the Philippines
DEPARTMENT OF EDUCATION, CULTURE AND SPORTS
UL Complex, Pasig, Metro Manila

June 29, 1994

DECS O R D E R
No. 46, s. 1994

PROVIDING THE NEW MINIMUM REQUIREMENTS FOR THE CERTIFICATE
AND DIPLOMA COURSES IN FISHERIES TECHNOLOGY

To: Bureau Directors, Regional Directors
Presidents, State Colleges and Universities
Heads of Private Schools, Colleges and Universities
Vocational School Superintendents/Administrators

1. This Office has approved the herein inclosed policies and minimum standards for the Certificate and Diploma Courses in Fisheries Technology in recognition of the need for a quality middle-level manpower equipped with desirable knowledge, skills, and values based on industry standards for employment and entrepreneurial demands.

2. This program has been developed through the collective efforts of both academe and experts from the school and industrial sectors in a series of consultative conferences and workshops conducted since 1991. It utilizes the DACUM method in curriculum development where practicing experts from fishery industries and schools in the country were made to undertake job analysis to establish occupational and competency profiles. Consequently, modules of employable skills were prepared to be used as the main instructional materials for these technology areas.

3. Competency-Based Vocational Education (CBVE) is the essential feature of these courses. Its competency framework is anchored on performance standards. Learners shall acquire the necessary occupational skills in a self-paced, learner centered system. This approach allows the learner to maximize his capabilities in order to attain the tasks inherent in acquiring employable skills without the constraint of time, provided that performance standards imperative in the job are satisfactorily met.

4. The new curriculum is hands-on oriented. The ratio between theory and practicum in all courses is 25:75, where 25% is the theory content and 75% is the practicum of technology component. A structured supervised industrial training (SIT) is assured in every competency level to give student ample time for industrial exposure to prepare himself in the world of work.

5. Inclosed are the following:

- a. Inclosure No. 1 - policy statements, guidelines and minimum standards for fishery technology education and training;

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- b. Inclosure No. 2 - list of occupations by major and competency level;
- c. Inclosure No. 3 - list of core subjects by level/occupation and recommended general fisheries and tool subjects and their descriptions; and
- d. Inclosure No. 4 - list of priority laboratory and field tools and equipment.

6. All technical and vocational education institutions (TVEIs) including private technical schools and colleges offering post-secondary technical courses in line with these curricular programs are encouraged to implement systematically as follows:


Level I Operator level - SY 1994-1995
 Level II Craftsman level - SY 1995-1996
 Level III Technician level - SY 1996-1997

7. Effective SY 1994-1995, schools offering any of the courses under MEC Order No. 4, s. 1981; MECS Order No. 31, s. 1983; and other legal issuances affecting the offerings of fishery technical education, shall undertake gradual phasing-out procedures for these courses. However, students enrolled in these courses, should be allowed to graduate. There shall be no enrolment allowed for those old curricular offerings beginning SY 1994-1995.

8. A structured training program for fishery instructors to be conducted in fishery industry and training centers, in order to ensure effective and efficient implementation of the new curricular program, is a significant component of the entire program.

9. This order supersedes all previous orders and other issuances on curricular programs for technical fishery education courses, specifically MEC Order No. 4, s. 1981 and MECS Order No. 31, s. 1983.

10. Compliance with this Order by all concerned is enjoined.


 ARMAND V. FABELLA
 Secretary

Incls.: As stated

References: MEC Orders (No. 4, s. 1981)
 MECS Order: (No. 31, s. 1983)

Allotments: 1-3-4--(M.O. 1-87)

To be indicated in the Perpetual Index
 under the following subjects:

Course of Study, COLLEBIATE
 CURRICULUM
 POLICY

PROGRAM, SCHOOL
 TECHNICAL EDUCATION
 VOCATIONAL EDUCATION

POLICY STATEMENTS ON FISHERY TECHNOLOGY EDUCATION AND TRAINING

Overall Policies:

1. Fishery Technology Education Program shall concentrate on the middle level education and training and shall consist of Level I, Level II, Level III, all competency based courses aimed to develop individuals in preparation for various occupational areas in the fishery sector as they go up to the educational ladder.

2. The three traditional areas of specializations: Fish Capture, Fish Culture and Fish Preservation, shall be provided for such that the graduate of any of the three areas shall have required knowledge and skills based on industry needs and standards thus providing better opportunities for employment and enterpreneurial activities.

3. There shall be exit points after such occupational level as follows:

Level I	:	Operator
Level II	:	Craftsman
Level III	:	Technician

4. The Curriculum shall be planned so as to meet the specific needs of secondary fishery school graduates and non-fishery school graduates of vocational schools and general high schools as well as walk-in clients who may wish to avail skills upgrading of his/her interest through the different learning packages contained in each occupational level in any of the three areas of specialization.

5. The core curriculum shall focus on Fish Production, Post-Harvest Technologies and Entrepreneurship. Specialized fishery enterpreneurial knowledge and skills shall be provided for those who opt to pursue a career on fishing business for specific fishery enterprise. It shall be dynamic and diversified ready to respond to the fast changing technologies and need of industry.

6. The curriculum shall provide flexibility where school administrators shall have discretionary powers to offer courses for other fishery related occupations not included in the occupational listings but deemed viable in a particular area (area/region specific technologies) provided that the school has both the physical and human resources. The Regional Office concerned must be informed of such course offering.

7. The curriculum shall provide five tool subjects, namely: Applied Physics, Applied Math, Applied Chemistry, Technical Drawing, and Technical English (with integration of values and ethics) in support to each occupational area as one learning package. Moreover, hands-on experiences shall be a vital.

part in each occupational level with strong participation from the fishery industries.

8. Students who complete any of the three occupational levels shall be awarded the following:

- a. Certificate of Completion for the operator's level
- b. Certificate of Completion for the craftsman's level
- c. Diploma for the Technician's level

However, students or walk-in clients who enrolled in or who completed only a given occupational area shall be awarded Certificate of Proficiency for a given level while if a student or walk-in client is interested or completed one modular unit of a learning package, he or she shall be awarded a Certificate of Competency.

9. Students who completed the operator and craftsman courses can proceed to the craftsman or technician courses respectively provided that all requirements of the operator and craftsman courses are duly complied with. Walk-in clients can take any given occupational area/learning package in any of the three levels and area of specialization provided that prerequisites are duly satisfied upon certification of the school registrar.

10. The minimum standards set forth herein shall be complied with before any school can offer the course. However, in the absence of some facilities/instruments/equipment, a school may conclude a Memorandum of Agreement (MOA) with fishery industries within the service area manifesting among others their willingness to accommodate the students for the use of their facilities.

11. The program is not a preparatory course to the Bachelor of Science in Fisheries (BSFi).

GUIDELINES AND MINIMUM STANDARDS FOR CERTIFICATE AND
DIPLOMA COURSES IN FISHERY TECHNOLOGY

I. GUIDELINES

A. Curriculum Goal and Objectives:

1. Goal

The program aims to prepare individuals for entrance to, and advancement in, the middle-level technical positions in fishery that will provide linkages and coordination between the artisan/aide in the workshop and the technologists.

2. Objectives

- a. To inculcate desirable values and work ethnics as a crucial factor in national development.
- b. To develop fishery competencies for entrance to various fishery occupations.
- c. To provide technical/technological knowledge and information which will enable the individual to analyze job/problems, and to perform problem-solving tasks with appropriate solutions.
- d. To provide general education that will enable the individual to behave within the accepted social norms.
- e. To develop entrepreneurial competencies that will lead to self-employment.

B. Program

1. Guiding Principles

The Certificate (CFT) and Diploma in Fishery Technology (DFT) is designed and structured under the following principles:

a. Supportive of National/Local Development Goals

The thrust in an accelerated agricultural based regional industrialization has continuously imposed increasing requirements for more technical types of skills such that a major concern is to match the quality and quantity of manpower to meet the demands and requirements of national/local development.

b. Production-oriented

Provision includes the strengthening of technician curriculum in order to produce graduates with increased capabilities for entrepreneurial endeavors.

c. Resource Management-Oriented

Although it is a technician curriculum, the graduates shall be imbued with the awareness of the importance of aquatic resource management for an economically viable and sustained development.

d. Flexibility, Economy and Viability

The curriculum provides for more flexibility to meet current and emerging needs. It includes requirements for minimal, additional inputs in terms of available operational outlay and training staff. Viability is assured in the sense that this curriculum fits into the existing structure of the institutions that will implement it.

e. Immediacy of needs

The technician curriculum is envisioned to meet the immediate needs of industrial establishments for adequately trained technician and to fill the void resulting from exodus of trained manpower to foreign countries.

f. Balance between theory and practice to meet domestic standards and requirements.

The curriculum provides for a balance between theory and practice as required by new trends in domestic employment situations.

g. Intensified industrial experience

The technician curriculum provides a massive and intensive industrial experience through on-the-job training to meet the developmental needs of the service area and strengthen the instructional programs.

2. Course Offerings

The level of industrial development of the country indicates the need of trained field and laboratory artisans, craftsmen and technicians in the fishery sector. For broader and better employment opportunities, the following are offered:

- a. Fishery Operator (Level I)
- b. Fishery Craftsman (Level II)
- c. Fishery Technician (Level III)

3. Production On-The-Job Training (OJT) and Community Service

Model income-generating projects (IGP) that are replicable in the locality should be established as a core of instruction and community service. These projects should be undertaken to meet the development needs of the service area.

Funds for model projects should be provided by the institutions concerned with the aim of making a profit. Incentive scheme should likewise be provided for students and teachers engaged in any production based projects to encourage significant student participation and raise productivity. In cases of a joint venture or partnership between the school and/or either external sources and the partnership student, wherein the latter provided the capital on a loan basis, profit sharing should be properly spelled out after deducting the cost of production. School profit share may be utilized for the maintenance and improvement of the school facilities and equipment production.

Program of activities for the Fishery Technology Curriculum should be well-organized in such a way that instructional, production, and community service can be implemented in an integrated manner.

II. MINIMUM STANDARDS

A. Program:

1. Instructional/Curriculum

The curriculum is planned to meet the specific needs of secondary fishery school graduates and non-fishery school graduates of vocational schools and general high-schools.

Levels I, II, and III are separate and independent from each other. There are exit points after the Level I as a semi-skilled worker, and after levels II and III course as a skilled worker.

The curriculum includes general fishery and specific technological subjects plus basic related subjects. Aside from these, on-the-job training will be a component of the curricula starting from Level I to Level III.

2. Research and Extension

A research program should be developed in collaboration with the established research institutions.

Research will cover any of the three areas in fishery technology, namely: Capture, Culture and Preservation to concentrate mainly on field testing/verification studies or adaptive research.

Community service shall serve as an extension activity.

B. Resources

At the beginning of the program, there should be a minimum of six (6) full-time fishery faculty distributed as follows: two (2) for capture, two (2) for culture, and two (2) for preservation, exclusive of the general education faculty.

1. Faculty and Staff

a. The minimum educational qualification of any faculty member should be at least a BS degree with specialization related to the subject to be taught and with appropriate industrial/technician training. At least 10 % should hold advanced training in fisheries or fishery related fields.

b. The institution must have a regularly funded faculty and staff development program to continuously update the contents of instruction.

c. In the assignment of teachers in the programs, preference shall be given to those who have been teaching the subject for at least two years and have at least V. S performance. There shall be a teacher-student ratio of 1:20 for technology subjects and 1:30 for academic subjects.

d. The regular teaching load of technical and non-technical faculty members shall conform with the existing Civil Service Rules and Regulations.

e. Research and extension services and other related involvement (supervisory related function) shall be included in determining the weekly loads of faculty members.

2. Student

Students from any income group would have equal access to the school without sacrificing academic standards. General Fisheries and Laws shall serve as an orientation for walk-in clients and students who are not graduates from fishery high schools and as refresher subject for graduates of secondary fishery schools.

3. Land

Fishery schools should be strategically located in areas where the requirements of the fisheries program can be maximized and effectively carried out.

There should be a minimum fishpond area of 5 hectares, 50% of which should have been developed at the start of the program.

4. Physical Facilities

a. Building Requirements

1. School buildings should comply with appropriate zoning and building regulations.
2. Laboratory floor space should be 1.85 sq.m. per student.
3. The shop floor space should be 3 sq.m. per student.
4. The classroom floor space should be 1.20 sq.m. per student.
5. There should be an adequate student accommodation.
6. Circulation areas should be approximately 30% of the sum of all teaching accommodation, (including storage), library, communal, administrative and other facilities.

b. Laboratory/Workshop Equipment and Facilities

1. Facilities should provide functional space that is flexible and adaptable for fishery technical/vocational program needs.
 - a. There should be both classroom and laboratory facilities to provide for the variety of educational experiences needed to achieve the program activities.
 - b. There should be adequate space for each student assigned to the facilities to meet the student performance objectives.
2. The facilities should meet the standard building code.
3. Facilities should be put up so that the environment will be conducive to learning.
4. Evaluation of facilities should be included on a regular basis as part of the school's total evaluation system.
5. Equipment should be the type which will provide technician education students with adequate learning experiences to develop the skills needed for employment

- in related business and industries.
6. Equipment should be available and is of sufficient quantity for all students in the program.
 7. There should be planned maintenance and replacement schedule for all equipment to meet safety regulations.
 8. Equipment should be meet all applicable standards.
 9. Equipment should be evaluated regularly on the basis of similarity to business and industry equipment subject to availability of funds.

c. Water and Power

The institution should have its own electric power if the source of electricity is inadequate. A very good source of water supply is a must for school use.

d. Learning Resource Center (Library)

1. Minimum of:

- Two (2) book titles (less than 10 years old) per subject for general education and three (3) book titles per technical subject.
- Two (2) technical journal (current) for the technical fishery courses.
- One (1) professional journal for faculty up-dating and professional growth.
- One (1) kind of national daily of sufficient copies.
- Seating capacity should be 20% of the combined total of students and academic staff.

2. Institutions with adequate capabilities shall establish learning resource centers separate from that of the secondary level.

e. Supportive Services

1. Health Services

There should be adequate and functional medical and dental clinics for students and staff.

2. Placement Services - Industrial Link Development Officer (ILDO)

Placement services shall include adequate coordination and strong linkages with accredited industry for an effective on-the-job training program.

3. Guidance Service

There should be functional career guidance services for in-school and off-school adjustment for students, particularly in determining their interest, attitudes and abilities for effective career choices, and expanding their individual options.

4. Security Services

There should be adequate security services for the school.

5. Recreation and Sports

Adequate recreation and sports facilities shall be provided .

6. Canteen Services

Each institution shall maintain a canteen and food service.

7. Dormitory

Dormitory shall be provided for students who may desire to stay in-campus.

5. Financial Requirements

There should be adequate funds for the school to carry out its activities effectively and thereby attain its objectives.

6. Academic Rules

a. Entrance Requirements

The entrance requirements to the Fishery Technology Education and Training are:

1. The applicant must be a secondary school graduate.
2. The applicant must be physically fit as certified by a government physician.
3. The applicant must be of good moral character as certified by the school principal.
4. The applicant must pass the oral and written examination.

b. Attendance

Student's attendance shall be governed by the rules and regulations prescribed by the institution.

A student shall be dropped from the class/roll when the hours lost through absence and/or late enrolment is ten percent

of the total prescribed number of hours of recitation, lecture, laboratory/ technology in one semester.

c. Study Load

A regular student shall carry only a load equivalent to the minimum number of units prescribed for the semester in which he or she is enrolled.

Strict adherence to the assignment of core subjects by level as prescribed should be observed. Pre-requisite subjects must be completed first before taking the succeeding subjects.

Candidates for graduation may be allowed to take three units more than the prescribed number during the second semester of the operator's course and during the last two semesters of the craftsman and technician courses provided the student has time to take additional load.

d. Grading/Credit System

The following grading system shall be applied:

1.0 to 1.5	- Superior
1.6 to 2.0	- Very good
2.1 to 2.5	- Good
2.6 to 3.0	- Fair or Passing
3.1 to 4.0	- Conditional Failure
4.1 to 5.0	- Failure
Inc.	- Incomplete
Drp.	- Dropped

A conditional failure in any course may be removed by a re-examination, and a grade of 3.0 may be given. Failure in the re-examination means a grade of 5.0. A re-examination is never given for the purpose of improving a passing grade. A conditional failure must be cleared within one semester from the date of receipt of grade. Conditional failure not removed within the prescribed length of time automatically becomes a failure.

Incomplete (inc.) is the grade given to a student who fails to complete the work in any course due to illness and other reasons beyond his control. A student who receives a grade of Inc. in any course is allowed to make-up for his deficiency within one semester from the time he receives such grade, and may be given a grade of higher than 3.0. The word dropped should be reflected in the transcript of records of any student who

drops before the mid-term examination. However, a student who drops after the mid-term shall be given a grade of 5.0 or failure.

A credit system should be implemented on the basis of one hour lecture per week, one credit unit and 3 hours lab./shopwork per week, one credit unit as a general policy.

e. Scholarship

1. Students of the program who graduated Valedictorian or Salutatorian from the secondary schools enjoy scholarship in form of free tuition fee and miscellaneous fees upon entrance.
2. Students who maintain/obtain a weighted average grade of 1.5 or higher with no grade lower than 2.0 in any subject shall enjoy free tuition in the next semester
3. Financial assistance shall be provided to the students in any of these grants in the form of :
 - Student Labor
 - Student Loan Grant
 - Income Generating Project (IGP)

f. School Fees

Tuition and other fees will be assessed on the basis of existing school policies.

g. Transfer of Students

Students coming from other TEI's or Fishery related programs may be admitted provided they meet all admission requirements set by the institution/school.

h. Unsatisfactory Scholastic Progress

A student who fails in three or more subjects in a semester shall be automatically dropped from the rolls of the institute/school, except in meritorious cases where a student may be allowed to continue under probation until a decision is made to reinstate or drop him from the rolls on the basis of his current performance.

i. Graduate with Honors

Students who complete their course with the following average, computed on the basis of their weighted grades shall be graduated with honors:

with highest honors	1.00 to 1.25
with high honors.....	1.26 to 1.50
with honors.....	1.51 to 1.75

j. Accreditation of Industrial Work Experience and Academic Work Completed Elsewhere.

1. Industrial work experience related to the technology course being pursued shall be accredited for the on-the-job training (OJT) provided the student passes a validation exam and that a certification duly signed by the shop superintendent or manager is submitted.
2. Related work experience prior to admission shall be accredited as OJT provided it is not beyond 2 years prior admission.
3. Students who have completed an equivalent academic work may request for credit to be applied to a particular subject or subjects through validation. Reciprocal validation likewise of academic subjects for students coming from tech-voc should likewise be accorded.
4. Graduates of the operator and craftsman courses in Fishery Technology can proceed to the craftsman or technician courses respectively provided that all requirements of the operator and craftsman courses are duly complied with.

k. Requirements for Graduation

A Certificate of Technology is awarded to the candidate upon completion of the curricular requirements prescribed for the operator and craftsman courses and a Diploma for Technology for the technician course.

FISHERY TECHNOLOGY CURRICULUM

LISTS OF OCCUPATIONS BY MAJOR AND COMPETENCY LEVEL

MAJOR	CAPTURE	CULTURE	PRESERVATION
LEVEL I (Operator)			
Occupations	1. Fishing crew	1. Fishpond caretaker	1. Fish processor
	2. Marine engine mechanic	2. Hatchery aide	2. Cannery aide
	3. Artificial reef operator	3. Seaweed farm operator	3. Prawn handler
LEVEL II (Craftsman)			
Occupations	1. Fishing master	1. Fishpond construction foreman	1. Fish processing plant overseer
		2. Fishpond grow out technician	
LEVEL III (Technician)			
Occupations	1. Fishing technician	1. Fishpond Management technician	1. Fish processing laboratory technician
		2. Hatchery technician	2. Fish processing plant manager
	Fishery Entrepreneur		

FISH CULTURE

Level I Operator

Occupation I Fishpond Caretaker

DUTIES

TASKS

- | | |
|--|--|
| A- Prepare the pond for stocking | A-1 Draining the pond |
| | A-2 Levelling and cultivating pond bottom |
| | A-3 Eradicating nuisance organisms |
| | A-4 Drying the pond bottom |
| | A-5 Flushing the pond |
| | A-6 Liming the pond |
| B- Grow natural food | B-1 Fertilizing the pond |
| | B-2 Admitting water in the pond at a desired depth |
| | B-3 Monitoring growth of natural food |
| | B-4 Increasing water at a desired level |
| C- Buy fish seedling | C-1 Identifying quality seedlings |
| | C-2 Counting and sorting of seedlings |
| | C-3 Handling and transporting seedling |
| D- Stock fry in the nursery pond | D-1 Acclimatizing fry to pond water temperature and salinity |
| | D-2 Counting fry |
| | D-3 Stocking fry |
| | D-4 Changing water in the nursery pond |
| E- Transfer seedling from nursery pond to rearing pond | E-1 Collecting seedlings in the nursery pond |
| | E-2 Counting seedlings in the nursery pond |
| | E-3 Transferring seedlings to the rearing pond |
| F- Rear various cultivable species | F-1 Rearing of bangus |
| | F-2 Rearing of tilapia |
| | F-3 Rearing of prawn |
| G- Harvest cultivable species in ponds | G-1 Surveying market demands |
| | G-2 Scheduling of harvest |
| | G-3 Harvesting bangus in ponds |
| | G-4 Harvesting tilapia in ponds |
| | G-5 Harvesting prawn |

H- Post-harvest handling

H-1 Handling and icing fish

D-2 Handling and icing prawn

I- Maintain fishpond facilities
and structures

I-1 Checking seepages and damaged
dikes

I-2 I-1.1 Repairing seepages and
damaged dikes

I-2 Checking damaged gates

I-2.1 Repairing damaged gates

I-3 Checking the efficiency of water
supply canal

I-3.1 Deepening and widening water
supply canal

I-4 Maintaining and repairing catching
gears

FISH CAPTURE

Level I Operator

Occupation I Fishing Crew

EQUIPES

A- Perform Deck Hand Operation

B- Handle Nets

C- Repair Nets

D- Perform Preventive Boat Maintenance

E- Handle Catch

F- Operate Fishing Gadetry

TASKS

A-1 Knowing the special features of fishing boats

A-2 Doing bends and hitches

A-3 Splicing ropes and cables

A-4 Rigging tackles and runners

A-5 Installing slings and spans

A-6 Anchoring

B-1 Setting net

B-2 Pursing

B-3 Hauling net

B-4 Filing net

C-1 Identifying damaged nets

C-2 Net mending

C-3 Net patching

C-4 Lacing

C-5 Replacing damaged ropes

C-6 Replacing floats and sinkers

D-1 Maintaining proper sanitation

D-2 Conducting boat orderliness

D-3 Inspecting safety devices

D-4 Painting boat and float parts

E-1 Brailing fish

E-2 Sorting fish

E-3 Using ice at sea

E-4 Applying some alternative system in chilling fish

E-5 Stewing

F-1 Manning power block

F-2 Manning hydraulic winch

F-3 Mannevering lightboat

G- Apply Safety of Life at Sea

H- Perform First Aid

F-4 Operating skiffboat

F-5 Viewing fish detection instruments

G-1 Doing survival swim

G-2 Using jackets and rings

G-3 Using inflatable life raft

G-4 Living in raft

G-5 Fire fighting onboard

G-5.1 Types of fire classifying and fire extinguishers

G-5.2 Using breathing gear

H-1 Performing artificial respiration

H-2 Treating bleeding

H-3 Treating wounds

H-4 Treating fractures

H-5 Treating heat injuries

FISH CAPTURE
Level I Operator

Occupation II Marine Engine Mechanic
(Diesel and gasoline)

DUTIES

TASKS

- | | |
|---|--|
| A- Overhaul marine engine | A-1 Identifying marine engine parts |
| | A-2 Familiarizing various engine parts |
| | A-3 Disassembling/assembling engine parts |
| | A-4 Checking and adjusting clearances, tolerances |
| | A-5 Replacing damaged/worn out parts |
| B- Perform trouble shooting | B-1 Diagnosing various troubles of diesel and gasoline engines |
| | B-2 Replacing/repairing damaged parts |
| C- Perform engine maintenance | C-1 Charting lubrication schedule |
| | C-2 Repainting engine/engine parts |
| | C-3 Cleaning the engine |
| | C-4 Inspecting worn-out parts |
| D- Recondition engine | D-1 Replacing standard or oversized engine parts |
| E- Perform basic electrical connection/installation | E-1 Identifying various electrical materials |
| | E-2 Connection/installing electrical wires |
| | E-3 Inspecting damaged electrical wiring parts |
| | E-4 Replacing damaged electrical wiring parts |

FISH CAPTURE
Level I Operator

Occupation III Artificial Reef Operator

DUTIES

TASKS

- | | |
|--|---|
| A- Survey and select site | A-1 Interviewing local fisherman |
| | A-2 Conducting under water observation |
| | A-3 Determining sites for artificial reef installation |
| B- Construct various types of artificial reefs | B-1 Preparing designs for artificial reef |
| | B-2 Estimating/costing bill of materials |
| | B-3 Constructing artificial reef |
| | B-3.1 Following construction procedures |
| C- Install artificial reefs | C-1 Working underwater |
| | C-2 Positioning of artificial reefs |
| D- Locate artificial reefs | D-1 Identifying artificial reef location |
| | D-1.1 Locating artificial reef through established bearings |
| | D-1.2 Locating artificial reef through depth |
| | D-1.3 Locating artificial reef through distance from shore |
| | D-2 Underwater diving |
| | D-2.1 Snorkeling and swimming |
| | D-2.2 Using compressed air |
| | D-2.3 Equalizing and decompressing techniques |
| | D-2.4 Interpreting diving tables |
| | D-2.5 Planning diving schedule |
| E- Harvest fish in artificial reefs | E-1 Designing various gears appropriate for AR fishing |
| | E-2 Constructing various gears appropriate for AR fishing |
| | E-3 Catching various species of fish within the AR's |

F- Maintain and repair artificial reefs

P-1 Inspecting artificial reefs periodically

F-2 Conducting actual major and minor repairs

G- Marketing

refer to MU

FISH CAPTURE
Level II Craftsman

Occupation I : Fishing Master

DUTIES

TASKS

- Seamanship

- A-1 Doing deck seamanship
- A-2 Boat handling
- A-3 Watchkeeping and standard command
- A-4 Anchoring
- A-5 Mooring
- A-6 Applying rules of the road
- A-7 Surviving at sea

- Navigate Fishing Craft

- B-1 Knowing navigation, the earth and its coordinates
- B-2 Reading nautical charts
- B-3 Identifying navigational aids
- B-4 Reading compass
- B-5 Identifying tides and currents
- B-6 Taking navigational fixes
- B-7 Using electronic navigation
- B-8 Piloting

- Monitor Oceanographic and Weather Conditions

- C-1 Determining current direction
- C-2 Identifying tidal occurrence
- C-3 Monitoring water depths
- C-4 Observing clouds formation
- C-5 Predicting weather conditions

- Attract and Aggregate Fish

- D-1 Attracting fish through light
- D-2 Aggregating fish by artificial shelter
- D-3 Assembling fish at designated point

- Detect Fish Concentration

- E-1 Identifying fish school sensually
- E-2 Detecting fish concentration through electronic instruments

- Catch Fish

- F-1 Monitoring volume of fish
- F-2 Positioning the boat for setting the gear
- F-3 Paying out the nets
- F-4 Closing gear bottom

C- Keep Records

H- Supervise Fishing Crew

F-5 Hauling fish

F-6 Brailing fish

G-1 Recording supplies and materials

G-2 Recording personnel activities

G-3 Logging navigational details

G-4 Documenting fishing activities

H-1 Understanding the nature of fishing crew

H-2 Leading people

H-3 Making people work

H-4 Initiating strategies for higher productivity

H-5 Exercising authority over crew

H-6 Making decisions

FISH CAPTURE

Level III Technician

Occupation II Fishing Technician

DUTIES

TASKS

A- Conduct Oceanographic Survey

- A-1 Sampling water parameter (temperature, salinity, depth, current, thermocline & nekton)
- A-2 Analyzing water parameters
- A-3 Plotting of contour line for each parameters
- A-4 Charting of fishing routes

B- Interpret Gear Plan and Designs

- B-1 Understanding various symbols and signs in the FAO fishing catalogue
- B-2 Identifying material requirements
- B-3 Interpreting gear size and other vital information
- B-4 Analyzing efficiency and effectiveness of the gear

C- Identify Various Materials for Fishing Gear Construction

- C-1 Listing of materials according to Plans and designs
- C-2 Classifying netting and non-netting materials
- C-3 Preparing bill of materials

D- Design Fishing Gear

- D-1 Preparing sketch plan
- D-2 Drawing gear plan to scale
- D-3 Placing specifications on material and gear component
- D-4 Printing of detailed fishing gear design

E- Construct Fishing Gear

- E-1 Procuring construction materials
- E-2 Preparing gear lay out
- E-3 Joining nettings
- E-4 Rigging floats and sinkers
- E-5 Installing gear accessories
- E-6 Checking workmanship and quality of work
- E-7 Preparing actual gear specifications details

F- Design and Construct Fish Attraction Devices

- F-1 Designing various types of fish shelters (PAD)
- F-2 Preparing bill of materials

F-3 Constructing various types of fish shelters

F-4 Conducting efficiency check-up

G- Recommends Appropriate Gear Design to Harvest Certain Fish Stock

G-1 Analyzing sizes and behavior of target species

G-2 Calculating economic advantages

G-3 Considering government regulations

G-4 Preparing plans and design

H- Recommend Fishing Boat Deck Layout

H-1 Identifying size and type of gear for use

H-2 Calculating boat tonnage

H-3 Establishing mechanical and stability advantages

H-4 Preparing deck layout

I- Conserve/Practice Maximum Utilization of Fishery Products

I-1 Understanding basic fisheries management concept

I-2 Monitoring catch assessment

I-3 Joining the drive for illegal fish

I-4 Initiating strategies for maximum utilization of fishery products

FISH PRESERVATION

Level I Operator

Occupation III : Prawn Handler

DUTIES

TASKS

A. Pre-process prawns

A-1 Classifying prawns into species

A-2 Weighing of prawns

A-3 Sizing prawns

B. Prepare prawn

B-1 Beheading

B-2 Peeling

B-3 Devicining

C. Freeze prawns

C-1 Weighing

C-2 Packing in styroboxes

C-3 Layering in freezing pans

C-4 Freezing packed prawns

4.1 Contact freezing

4.2 Air-blast freezing

D. Pack and store frozen prawn blocks

D-1 Thawing and glazing

D-2 Packing and Casing

D-3 Storing

FISH PRESERVATION
Level II Craftsman

OCCUPATION I Fish Processing Plant Supervisor

DUTIES	TASKS
A- Supervise Fish Handlers	A-1 Ensuring quality raw materials A-2 Ensuring proper hygiene and sanitation of working areas, containers and other fish processing facilities A-3 Ensuring correct sizing of raw materials per market preference/standard A-4 Ensuring correct icing/freezing of raw materials
B- Identify Fish Processing Facilities/ Equipment	B-1 Ensuring right can/bottle sizes per market preference/standard B-2 Ensuring appropriate/efficient drying trays/racks, salting vats and smoke boxes
C- Supervise Fish Processing	C-1 Ensuring desired processing styles/forms in drying, salting and smoking per market preference/standard C-2 Directing correct can/bottle filling, butchering/splitting, salting and smoking procedures C-3 Directing correct can/bottle sealing C-4 Ensuring correct pressure and processing time C-5 Directing proper cooling of canned/boiled products C-6 Ensuring acceptable saltings of dried, salted and smoked fish per market preference and standard C-7 Ensuring correct moisture content of dried fish per market preference/Standard C-8 Ensuring acceptable quality of processed products
D- Supervise Processed Product Storage	D-1 Ensuring sanitation and hygiene of storage/bodega D-2 Directing correct filing/storing of processed products D-3 Managing inventories

FISH PRESERVATION

Level I

Operator

Occupation I Fish Processor

DUTIES

TASKS

A- Handle Fish

A-1 Observing care, hygiene and sanitation in handling fish

A-2 Grading and classifying of fish

A-3 Icing excess fish supply

B- Preserve Fish by Salting and Drying

B-1 Preparing raw materials

B-2 Brine-salting

B-3 Drying fish/packing and storing of fish

C- Smoke Fish

C-1 Preparing raw materials

C-2 Brine-salting

C-3 Pre-cooking

C-4 Partial-drying

C-5 Smoking

C-6 Packing and storing finished products

D- Process Fish into Patis & Bagoong

D-1 Preparing raw materials

D-2 Mixing salt and fish

D-3 Fermenting salt and fish mixture

D-4 Draining of patis

D-5 Bottling and packing of patis and bagoong

E- Process Fish into better/convenient food items

E-1 Preparing smoke soft-boned bangus

E-2 Deboning bangus

E-3 Processing spicy dilis

E-4 Processing tuna embutide

E-5 Processing fish sausage

F- Marketing

Refer to MJ -

FISH PRESERVATION

Level I Operator

Occupation II : Cannery Aide

DUTIES

TASKS

- | | |
|---|--|
| A- Handle Fish | A-1 Washing of fish
A-2 Grading/classifying incoming raw materials
A-3 Gilling and gutting of fish
A-4 Weighing of fish
A-5 Icing of excess fish supply |
| B- Steam Fish | B-1 Arranging fish in metal trays
B-2 Steaming fish for pre-cooking
B-3 Cooling fish |
| C- Prepare Fish for Packing | C-1 Beheading of fish
C-2 Skinning of fish
C-3 Joining of fish
C-4 Sorting of loins |
| D- Can Fish | D-1 Packing of fish in cans
D-2 Sealing of cans
D-3 Pressure cooking of canned fish
D-4 Cooling of canned fish
D-5 Incubating canned fish |
| E- Prepare Canned Fish for Market | E-1 Labelling
E-2 Packing |
| F- Process Cannery Trimmings into Fish Meal | F-1 Cooking of cannery trimmings
F-2 Pressing of cooked meal
F-3 Drying of pressed meal
F-4 Grinding of dried meal
F-5 Bagging
F-6 Warehousing of fish meal |

FISH CULTURE
Level III Technician

Occupation I Fishpond Management Technician

DUTIES

A- Oversee operation of fishpond and facilities

B- Supervise production plans

C- Supervise repair works

D- Manage business enterprise

TASKS

A-1 Breeding spawners naturally
A-1.1 Monitoring gonadal development spawning

A-1.2 Determining fecundity

A-2 Breeding spawners artificially

A-2.1 Monitoring gonadal development spawning

A-2.2 Determining fecundity

A-3 Managing operations of fishpond facilities

B-1 Making report

B-1.1 Gathering data

B-1.2 Analyzing data

B-1.3 Interpreting data

B-1.4 Submitting reports

B-2 Supervising work development

B-2.1 Monitoring stocks in pond compartments

B-2.2 Monitoring harvest/post-harvest activities

B-2.3 Managing transport/marketing

C-1 Supervising repair works of damaged facilities

Refer MU on Fish Entrepreneurship

FISH CULTURE
Level III Technician

Occupation II

Hatchery Technician

DUTIES

TASKS

- A- Make plan for hatchery site
 - A-1 Selecting site
 - A-1.1 Inspecting the site
 - A-1.2 Identifying criteria for site selection
 - A-2 Acquiring property
 - A-3 Designing hatchery
 - A-4 Preparing work schedule/flow charts/GPM
- B- Supervise construction of hatchery
 - B-1 Identifying needed equipment/materials
 - B-2 Deploying workers
 - B-3 Lay-out the area
 - B-4 Monitoring work plans
- C- Oversee operation of hatchery and
 - C-1 Breeding spawners naturally
 - C-1.1 Monitoring gonadal development
 - C-1.2 Determining fecundity
 - C-2 Breeding spawners artificially
 - C-2.1 Monitoring gonadal development/spawning
 - C-2.2 Determining fecundity
 - C-3 Managing operations of hatchery facilities
- D- Supervise production plans
 - D-1 Making reports
 - D-1.1 Gathering data
 - D-1.2 Analyzing data
 - D-1.3 Interpreting data
 - D-1.4 Submitting reports
 - D-2 Supervising work development
 - D-2.1 Monitoring algal tanks operations
 - D-2.2 Monitoring larval rearing tanks (LRF) operation
 - D-2.3 Monitoring harvest/post-harvest activities
 - D-2.4 Managing transporting marketing activities

(See MU Fish Entrc.)

FISH CULTURE

Level II - Craftsman

Occupation II

Fishpond Grow-Out Technician

DUTIES

TASKS

- | | |
|--------------------------|---|
| A- Identify fish | A-1 Identifying fish species (nomenclature)
A-2 Classifying fish species
A-3 Describing/hacing fish biology
A-4 Identifying fish morphology
A-5 Determining fish taxonomy |
| B- Prepare feed | B-1 Determining amount of feed
B-2 Measuring amount of feed
B-3 Feeding fish |
| C- Formulate feed | C-1 Identifying feed ingredients loc. available as protein source
C-2 Formulating mixture
C-3 Purchasing ingredients
C-4 Weighing ingredients
C-5 Mixing ingredients
C-6 Processing ingredients
C-7 Drying feed
C-8 Packing feed
C-9 Storing feed |
| D- Monitor fish diseases | D-1 Determining fish diseases
D-2 Identifying etiology
D-3 Prescribing preventive/curative measures for control of disease
D-4 Treating infected fish |
| E- Handle chemicals | E-1 Acquainting with chemicals
E-1.1 Identifying trade/common names of chemicals
E-1.2 Writing chemical formula/reactions
E-2 Listing chemicals
E-3 Measuring chemicals
E-4 Preparing solutions
E-5 Storing chemicals/solutions
E-6 Observing safety |

F-1 Maintain laboratory facilities

- F-1 Maintaining laboratory facilities and equipments
- F-2 Listing of laboratory facilities and equipment
- F-3 Operating laboratory equipment and facilities
- F-4 Maintaining safety
- F-5 Maintaining sanitation

FISH CULTURE

Level II Craftsman

Occupation I

Fishpond Construction Foreman

DUTIES

A- Plan fish farm

B- Design fishpond

C- Review fishpond plan

C- Manpower/pooling and recruitment

E- Purchase materials

F- Transport and handle materials

G- Supervise work

TASKS

A-1 Selecting site

A-1.1 Inspecting the site

A-1.2 Identifying criteria for site selection

A-2 Determining type of fish farm

A-3 Selecting fish suitable for culture

A-4 Determining construction scheme

B-1 Designing fishpond

B-2 Interpreting design terminology data

C-1 Reading working plan

C-2 Preparing program of activities

D-1 Advertising job vacancies

D-2 Recruiting needed workers

E-1 Checking funds

E-2 Identifying needed materials/equipment

E-3 Canvassing needed materials and equipment

E-4 Purchasing needed materials/equipment

F-1 Transporting materials/equipment to site

F-2 Storing materials/equipment

G-1 Orienting workers

G-2 Deploying workers to site

G-3 Checking work development

G-4 Making minor decision

G-5 Reporting developments/problems of work

G-6 Consulting with pond owners

G-7 Giving recommendations/suggestions

H- Construct pond

- H-1 Surveying the land
- H-2 Marking cut area (Layouting)
- H-3 Measuring and mark out walls
- H-4 Excavating pond bottoms
- H-5 Building drainage
- H-6 Building water inlet
- H-7 Building walls
- H-8 Sealing pond bottoms/walls

H- Post-harvest handling

H-1 Handling and icing fish

D-2 Handling and icing prawn

I- Maintain fishpond facilities
and structures

I-1 Checking seepages and damaged
dikes

I-2 I-1.1 Repairing seepages and
damaged dikes

I-2 Checking damaged gates

I-2.1 Repairing damaged gates

I-3 Checking the efficiency of water
supply canal

I-3.1 Deepening and widening water
supply canal

I-4 Maintaining and repairing catching
gears

FISH CULTURE

Level I Operator

Occupation II

Hatchery Aide

DUTIES

TASKS

- | | |
|--|---|
| A- Prepare tank | <ul style="list-style-type: none"> A-1 Cleaning the tank A-2 Installing hatchery equipment and accessories A-3 Filling tank with desired H₂O level |
| B- Locate source of Spawners/
brood stock | <ul style="list-style-type: none"> B-1 Selecting breeders/spawners <ul style="list-style-type: none"> B-1.1 Picking of breeders B-2 Transporting breeders/broodstock |
| C- Stock breeders | <ul style="list-style-type: none"> C-1 Disinfecting spawners/breeders C-2 Acclimatizing spawners/breeders C-3 Stocking breeders/spawners |
| D- Feed Breeders | <ul style="list-style-type: none"> D-1 Feeding natural and artificial feeds D-2 Monitoring food amount and consumption |
| E- Assist in breeding | <ul style="list-style-type: none"> E-1 Preparing equipments needed for breeding E-2 Assisting technician in breeding |
| F. Rear larvae | <ul style="list-style-type: none"> F-1 Monitoring spawning & hatching F-2 Stocking Nauplii F-3 Feeding and foods of larvae <ul style="list-style-type: none"> F-3.1 Growing natural food F-3.2 Preparing other larval food F-3.3 Determining amount of food F-3.4 Feeding scheme F-4 Managing water in tanks F-5 Rearing postlarvae in tank |
| G- Sample Larvae | <ul style="list-style-type: none"> G-1 Collecting larvae G-2 Determining density |
| H- Harvesting stocks | <ul style="list-style-type: none"> H-1 Preparing harvesting equipment H-2 Draining the tank H-3 Collecting stock H-4 Grading stocks |

I- Post harvest handling/
activities

- 1 Counting stocks
- Packing stocks in containers
- 2 Transporting stocks to market
- 3 Observing sanitation, safety
measures and maintenance of
hatchery

FISH CULTURE

Level I Operator

Occupation III Seaweed Farm Operation

DUTIES

TASKS

- | | |
|--|---|
| A- Site selection and preparation | A-1 Surveying bays, covers |
| | A-2 Recording physic-chemical characteristic of water |
| | A-3 Clearing of the area |
| | A-3.1 Removing floating debris and nuisance species |
| B- Seaweed planting | B-1 Selecting seaweed farming method |
| | B-2 Installing seaweed planting materials |
| | B-3 Weighing/estimating plant seeds |
| | B-4 Attaching seaweed seeds in clutches |
| C- Sample seaweeds | C-1 Collecting/getting seaweed samples |
| | C-2 Determining gain in weight and size of seaweeds |
| D- Harvest and Post Harvest Activities | D-1 Placing in bamboo baskets |
| | D-2 Drying |
| | D-3 Washing |
| | D-4 Redrying |
| | D-5 Packing |
| | D-6 Transporting to control processing establishment |

Description of Core Subjects for the Revised Fishery Technology
Curricula (Certificate and Diploma)

CAPTURE

- Fishing Operation I - The mechanics of fishing gear design and construction, materials selection and testing. Identification of appropriate fishing gears to be used in the locality. Includes interpretation of fishing gear plans.
- Credit: 5 units ----- 9 hours a week
(3 lec. and 6 lab.)
- Artificial Reef Design and Construction - Design and construction of different artificial reef facilities. Bill of materials and cost estimates. Under-water installation and location.
- Credit: 4 units ----- 8 hours a week
(2 lec. and 6 lab.)
- Navigation and Seaman-ship I - Fundamentals of coastal and high seas navigation, seamanship, types of navigational instruments and apparatus; application of geographical navigation; elements of weather.
- Credit: 5 units ----- 9 hours a week
(3 lec. and 6 lab.)
- Boat & Engine Operation, Repair & Maintenance I - Handling and maintenance of small fishing crafts. Overhauling and trouble-shooting, and reconditioning of engine. Basic electrical connection and installation.
- Credit: 4 units ----- 8 hours a week
(2 lec. and 6 lab.)
- Post Harvest Handling - Principles of handling, icing, storing of fish and fishery products.
- Credit: 3 units ----- 5 hours a week
(2 lec. and 3 lab.)

- Fishing Operation II - Fishing gear handling, repair and maintenance in inshore fisheries.
- Credit: 5 units ----- 9 hours a week
(3 lec. and 6 lab.)
- Navigation and Seaman- - Practices of coastal and high seas
ship II navigation methods and deck seamanship, including actual fishing on board fishing boats.
- Credit: 5 units ----- 9 hours a week
(3 lec. and 6 lab.)
- Boat & Engine Operation,- Handling and maintenance of commercial
Repair & Maintenance II fishing crafts. Includes the operation, maintenance and repair of marine engine and deck machineries. Principles and operation of hydraulic equipment.
- Credit: 5 units ----- 9 hours a week
(3 lec. and 6 lab.)
- Oceanography - General survey of the sea as a marine environment. The Physics, chemistry and biology of ocean waters.
- Credit: 3 units ----- 3 hours a week
(3 lecture)
- Fishing Operation III - Fishing gear operation in commercial fisheries. This includes fish detection techniques and gear maintenance. Design and construction of commercial fishing gears and facilities.
- Credit: 5 units ----- 9 hours a week
(3 lec. and 6 lab.)
- Fishing Extension - Philosophy, principles, practices,
Education procedures of organization and program planning in extension services; study of cooperatives for fishing enterprises.
- Credit: 3 units ----- 3 hours a week
(3 lecture)
- Marine Resource - Basic principles and methods of
Management management and conservation of the resources in marine fisheries. This includes stock assessment.
- Credit: 3 units ----- 5 hours a week
(2 lec. and 3 lab.)

CULTURE

- Freshwater Fish Culture - Principles and techniques involved in the cultivation of fresh water species.
Credit: 5 units ----- 9 hours a week
(3 lec. and 6 lab.)
- Brackishwater Fish Culture - Principles and techniques involved in the cultivation of brackish water species.
Credit: 5 units ----- 9 hours a week
(3 lec. and 6 lab.)
- Mariculture - Principles and practices of culturing oysters, mussels, sea weeds and other marine species in bays, lagoons and coastal waters.
Credit: 4 units ----- 8 hours a week
(2 lec. and 6 lab.)
- Post Harvest Handling - Principles and methods of handling, storage, preservation and transport of fish and other fishery products.
Credit: 3 units ----- 5 hours a week
(2 lec. and 3 lab.)
- Fish Culture Site Management - Principles and methods of rehabilitating and managing mangroves and other fish culture sites; elements of weather.
Credit: 5 units ----- 9 hours a week
(3 lec. and 6 lab.)
- Fish Culture Facilities Design & Construction - Fishpond Engineering. Design, construction and maintenance of fresh estuarine and marine aquaculture facilities including culture, protection, principles and practices in these environments.
Credit: 5 units ----- 9 hours a week
(3 lec. and 6 lab.)

- Water Management - Monitoring of the physical, chemical and biological parameters of the water.
Credit: 4 units ----- 8 hours a week
(2 lec. and 6 lab.)
- Feeds and Feeding Management - Feed preparation and feeding techniques.
Credit: 4 units ----- 8 hours a week
(2 lec. and 6 lab.)
- Fish Seed Production - Fundamentals of fish breeding, hatchery and nursery operations; the biology and culture of fish and other aquatic animals in their early life stages.
Credit: 5 units ----- 9 hours a week
(3 lec. and 6 lab.)
- Aquaculture Extension - Extension philosophy, psychology, organization and programming of extension education and the basic components effective extension which includes information dissemination, training and demonstration, exhibits and other visual aids. Includes the study of fishery cooperative.
Credit: 5 units ----- 9 hours a week
(3 lec. and 6 lab.)
- Aquaculture Business Enterprise - Business management and legal aspects of fish culture operation.
Credit: 5 units ----- 9 hours a week
(3 lec. and 6 lab.)
- Pest and Parasites - The nature and mode of infestation of common pest and parasites of fishes; their practical identification, prevention and control.
Credit: 4 units ----- 8 hours a week
(2 lec. and 6 lab.)

PRESERVATION

- Fish Microbiology - Bacteria, yeast and molds, their morphology, characteristics, functions, effects, treatment and control. Identification of health hazard microorganisms.
- Credit: 5 units ----- 3 hours a week
(3 lec. and 6 lab.)
- Plant Sanitation and Safety - Hygiene principles and practices in fish processing plant including the safe and proper use of tools, equipment and machineries.
- Credit: 3 units ----- 3 hours a week
(3 lecture)
- Fish Curing - Principles and general methods of fish curing to include salting, smoking, pickling, drying.
- Credit: 5 units ----- 9 hours a week
(3 lec. and 6 lab.)
- Fish Handling and Refrigeration - Principles of handling, icing, storing of fish meat, poultry, fruits and vegetables and its by products.
- Credit: 3 units ----- 5 hours a week
(2 lec. and 3 lab.)
- Fisheries Economics - Fundamentals of economics analysis focusing on the basic laws and principles related to fishery.
- Credit: 3 units 3 hrs. a week
(3 lec.)
- Canning - Application of canning principles including methods, techniques on commercial scale operations.
- Credit: 5 units ----- 9 hours a week
(3 lec. and 6 lab.)

Machineries & Appliances- Principles of operation and maintenance of machineries and appliances used in processing fish.

Credit: 3 units ----- 3 hours a week
(3 lec. and 6 lab.)

Fish Chemistry

- Integration, application of the theories of organic chemistry to the properties and chemical reactivities of proteins, fats and carbohydrates with emphasis on fish.

Credit: 4 units ----- 8 hours a week
(2 lec. and 6 lab.)

Minor Fishery Products

- Basic principles and practices of fish processing management in small scale industries.

Credit: 3 units ----- 3 hours a week
(3 lecture)

Fish Extension
Education II

- Application of canning principles including methods, techniques on commercial-scale operations.

Credit: 5 units ----- 9 hours a week
(2 lec. and 6 lab.)

Packaging

- Principles of fish packaging, package types; packaging materials for different processed fish products.

Credit: 4 units ----- 8 hours a week
(2 lec. and 6 lab.)

Product Analysis and
Standardization

- Product analysis which includes organoleptic assessment, objective analysis (chemical-micro-biological); processing requirements and establishment of products standard.

Credit: 5 units ----- 9 hours a week
(3 lec. and 6 lab.)

Product Development

- New developments in processing fish; development of new products.

Credit: 5 units ----- 9 hours a week
(3 lec. and 6 lab.)

CAPTURE, CULTURE, PRESERVATION

Level III Technician

Occupation: Fishery Entrepreneur

The student may specialize in any of the following Fishery Enterprises:

1. Dried fish trading/marketing
2. Fresh fish trading/marketing
3. Fishing supply trading/marketing
4. Fish Processing
5. Fishpond supply trading/marketing
6. Fish growout business
7. Prawn hatchery business
8. Fish/Prawn seedling marketing
9. Fishing
10. Fish Fingerling industry
11. Lapu-lapu seedling and growout business
12. Shellcraft business

CORE SUBJECTS BY LEVEL/OCCUPATION(S)

(Focus: Marketing, Production, Post-Harvest Technologies)

	CAPTURE	CULTURE	PRESERVATION
LEVEL I (1st Year)	Fishing Operation I	Freshwater Fish Culture	Fish Microbiology
	Artificial Reef Design and Construction	Brackishwater Fish Culture	Fish Curing
	Navigation and Seamanship I	Mariculture	Plant Sanitation and Safety
	Boat and Engine Operation, repair and Maintenance I	Post-Harvest Handling	Fish Handling and Refrigeration
	Post-Harvest Handling	Field Work	OJT
	OJT		
LEVEL II (2nd Year)	Marine Ecology	Fish Culture Site Management	Canning
	Fishing Operation II	Fish Culture Facilities Design and construction	Machineries and Appliances
	Navigation and Seamanship II	Water Management	Fisheries Economics
	Boat and Engine Operation, Repair and Maintenance II	Pests and Parasites	Fish Chemistry
	Oceanography	Feeds and Feeding Management	Minor Fisheries Products
	OJT	OJT	OJT
LEVEL III (3rd Year)	Fishery Business II	Fish Seed Production	Fisheries Extension Education II
	Fishing Operation III	Aquaculture Extension	Product Analysis and Standardization
	Marine Resource Management	Aquaculture Business Enterprises	Product Development
	OJT	OJT	OJT

FISH PRESERVATION

Level III Technician

Occupation II : Fish Processing Plant Manager

DUTIES

TASKS

A- Decide in the Different Technological Alternatives

- A-1 Deciding level of fish processing technology
- A-2 Identifying species/variety of raw material inputs
- A-3 Deciding types/kinds of machine and equipment
- A-4 Deciding fish process specificatio container to be used
- A-5 Deciding efficient plant layout
- A-6 Identifying type of production system
- A-7 Deciding ideal plant location

B- Plan Production Activities

- B-1 Deciding volume of production
- B-2 Programming inflow and outflow of raw materials
- B-3 Programming work flows
- B-4 Programming use and maintenance of machines and equipment

C- Organize Production Activities

- C-1 Organizing working crew
- C-2 Listing jobs and preparing job design
- C-3 Orienting supervisors, leadman, workers to their duties and responsibilities
- C-4 Orienting personnel/workers to company standard/expectations/policies
- C-5 Preparing work schedule/shifting

D- Coordinate Production Activities

- D-1 Confering with company staff and line supervisors re: production plans, organization and alternative technologies

E- Control Production Activities

F- Direct Production Activities

G- Evaluate Production Activities

I- Develop Product Quality

D-2 Coordinating all work flows/activities in all processing department sections

E-1 Managing and controlling inventory properly

E-2 Controlling production within plant capacity and market demands

F-1 Formulating work standards to increase workers productivity

F-2 Orienting workers on safety measures

F-3 Directing efficient process flow

F-4 Motivating workers

G-1 Evaluating production efficiency of machineries

G-2 Evaluating production performance of workers

G-3 Evaluating feedbacks from market consumers

G-4 Evaluating viability of project

I-1 Controlling manufacturing information

I-2 Controlling purchases and storage materials

I-3 Controlling manufacturing process

I-4 Controlling processed products

I-5 Instituting corrective action

E- Supervise Shipping of Goods
Products

1. Ensuring correct containers per market
preference/Standard and shippers

Regulations/Standard

E-2 Directing proper packaging

E-3 Ensuring safe and economical shipping
procedures

FISH PRESERVATION

Level III Technician

Occupation I Fish Processing Laboratory Technician

DUTIES

TASKS

A- Fish Processing

- A-1 Determining sampling schedule and number of samples for laboratory examination
- A-2 Identifying raw materials through sensory evaluation, physic-chemical and microbiological analysis
- A-3 Operating laboratory apparatus/equipment in determining quality indices of raw materials and its maintenance throughout
- A-4 Preparing quality control chart
- A-5 Preparing media for microbiological culture

B- Fish Inspection

- B-1 Inspecting and ensuring sanitation observance and maintenance
- B-2 Monitoring and recording maintenance of quality throughout fish preservation process

C- Quality Control

- C-1 Determining raw materials and finished products defects through sensory evaluation or physical method
- C-2 Classifying/grading raw materials for processing

RECOMMENDED GENERAL EDUCATION SUBJECTS FOR THE REVISED
DIPLOMA IN FISHERIES TECHNOLOGY CURRICULA
(CAPTURE, CULTURE, PRESERVATION)

- English I - (Communication skills/Arts I) Technical Selection-Reading, Writing, listening and using of materials on both technical and non-technical literature.
- Credit: 3 units ----- 3 hours a week
(3 lec.)
- English II - (Communication skills/Arts II) Technical Writing/Reporting in Fishery and Technical Subjects, practices and principles of correspondence writing such as letters of application, sales and order letters, collecting inquiry, claims and adjustments and study of professional interview.
- Credit: 3 units ----- 3 hours a week
(3 lec.)
- Math I - Integrated College Algebra; Plane Trigonometry and Statistics and their application to fisheries.
- Credit: 3 units ----- 3 hours a week
(3 lec.)
- Applied Chemistry I - Principles of chemistry and their application to fisheries.
- Credit: 4 units ----- 8 hours a week
(2 lec. and 6 lab.)
- * Applied Chemistry II - Principles of organic chemistry and their application to fisheries. The application of organic chemistry theories to properties and chemical reaction involving organic compound as they apply to fish and fishery products. It also includes enzymes as related to fishery biological reaction.
- Credit: 4 units ----- 8 hours a week
(2 lec. and 6 lab.)
- Physics - Fundamentals of physics and its practical application to fisheries.
- Credit: 4 units ----- 6 hours a week
(2 lec. and 6 lab.)

RECOMMENDED COMMON FISHERIES SUBJECTS:
(Capture, Culture and Preservation)

General Fisheries & Laws- Overview of the three major fields of specialization, namely: Marine, Inland, and Processing. It includes fishery laws and affecting exploitation, protection and conservation of fishery resources.

Credit: 3 units ----- 3 hours a week
(3 lec.)

Technical Drawing - Study of the methods and techniques of reading and interpreting working plans, application of principles of both freehand and mechanical drawing and design applicable to fishery activities. It includes the correct maintenance and proper manipulation of drawing instruments.

Credit: 3 units ----- 3 hours a week
(3 lec.)

Aquatic Biology - The biology of economically important flora and fauna including their anatomy and taxonomy.

Credit: 5 units ----- 9 hours a week
(3 lec. and 6 lab.)

Fishery Business I - Basic principles and techniques in the operation and management of commercial fishery enterprises with emphasis in fish trading and marketing including basic accounting and bookkeeping.

Credit: 3 units ----- 3 hours a week
(3 lec.)

Fisheries Extension - Extension philosophy, psychology, organization and programming of extension education and the basic components effective to extension which includes information dissemination, training and demonstration, exhibits and other visual aids. Includes the study of fishery cooperatives.

Credit: 3 units ----- 3 hours a week
(3 lec.)

Values Education I - (Social and Moral Values) Deals with the role of ethics in industry. Improvement and reinforcement of student's knowledge, abilities, skills and attitudes to become a desirable citizen worker as to cope with and adjust to workers and fellowmen, to superior and peers in the company where he works and to his country.

Credit: 1 unit ----- 1 hour a week
(1 lec.)

Values Education II - (Employment Orientation) Focused on the study of Filipino values and its harmonizing effect with the required institutional values of the business world. Designed to prepare the student for his role in industry through the inculcation of awareness of labor market conditions and opportunities, loyalty and discipline, compensation and rewards. Development of a strong sense of responsibility as a prospective industrial technician fully aware of his rights as well as duties and obligations.

Credit: 1 unit ----- 1 hour a week
(1 lec.)

** Elective - A choice of any subject relevant to specific major/technology.

* For Fish Capture Only

** For Fish Culture & Fish Preservation Only

LIST OF PRIORITY LABORATORY AND FIELD TOOLS AND EQUIPMENT
CERTIFICATE AND DIPLOMA OF FISHERY TECHNOLOGY

Quantity
(Equip. - Student ratio)

I. Fish Capture

A. Navigation Laboratory

1. Marine Magnetic Compass (standard)	1:20
2. Aneroid Barometer	1:20
3. Parallel Ruler	1:1
4. Pelorus	1:10
5. Radar	1:20
6. Assorted Nautical Charts in the Phil.	1:1
7. Tide Tables and Almanacs	1:20
8. Sextant	1:20
9. Drafting Table	1:1
10. Triangle (12", 30", 45")	1:1
11. Divider	1:1
12. F Square	1:5
13. Radio Transceiver (VHF)	1:20

B. Seamanship

1. Chain Block (3 tons)	1:20
2. Pulleys (6 dia.)	1:20
3. Hooks and Thimbles	1:5
4. Life Vests	1:1
5. Assorted Shackles	1:5
6. Ropes, twines	1:5
7. Shift and Bars	1:20
8. Jackies and Swivels	1:5
9. Snake	1:1
10. Clamps	1:5

C. Fishing Gear and Net Loft

1. Assorted mesh gauges	1:1
2. Assorted net needles	1:1
3. Bench vises	1:20
4. Chain cutter	1:20
5. Hammer	1:1
6. Hand carts/wheel barrow	1:50
7. Hand winch	1:20
8. Marline spikes	1:1
9. Net rollers	1:20
10. Netting knives	1:1
11. Assorted neettinas	1:20

D. Net and Gear Preparation

1. Gill net	1:20
2. Trawl net	1:20
3. Longline (20 baskets)	1:20
4. Ring net and haquet	1:20

- 5. Models/charts of different commercial and sustenance fishing gears 1:5
 - 6. Artificial reef models 1:5
 - 7. Other local fishing gears 1:20
- note: items 1-4 depending on local conditions.

E. Fishing Boats

- 1. Wooden vante with outriggers 1:2
- 2. Motorized banca, 16 HP 1:20
- 3. Wooden fishing boat, 10 tons gross 1:20

F. Deck Machinery and Hydraulic

- 1. Demonstration compressor unit 1:20
- 2. Demonstration winch 1:20
- 3. Electrical Power Supply 1:20
- 4. Electrician Pliers 1:1
- 5. Electrician screwdrivers 1:1
- 6. Gas leak detectors 1:20
- 7. Grease guns 1:10
- 8. Hack saws 1:1
- 9. Hydraulic oil tank and circuit 1:20
- 10. Hydraulic pump and motor 1:20
- 11. Pipe treading tools 1:20
- 12. Pipe cutters 1:20
- 13. Pipe wrench 1:5
- 14. Wrenches 1:5
- 15. Vises 1:10
- 16. Oceanographic winch 1:20
- 17. Engine aligning tools 1:20

G. Physical oceanography and meteorology laboratory

- 1. Compound microscope 1:5
- 2. Depth recorder/fish finder 1:20
- 3. Current meter 1:20
- 4. Nansen bottle 1:20
- 5. Wind vane 1:20
- 6. Anemometer 1:20
- 7. Barometer (see navigation lab.) 1:20
- 8. Rain gauge 1:20
- 9. Weather charts 1:5
- 10. Thermometer (0-100°C) 1:5
- 11. Salinometer 1:20

H. Boat and Engine Laboratory

- 1. Carpentry tools 1:5
- 2. Mechanical tools 1:5
- 3. Hull structure model 1:20
- 4. Outboard and inboard motor for repair practice 1:20
- 5. Working tables 1:5

I. Diving Apparatus

- 1. Scuba tank set 1:10

2. Regulator	1:10
3. Depth gauge	1:10
4. Pressure gauge	1:10
5. Diving suit with boots	1:10
6. Compressor	1:20
7. Plastic hose	1:10
8. Mask	1:10
9. Tank refiller	1:20
10. Fins	1:10
11. Divers watch	1:10
12. Snorkel	1:10
13. Weights	1:10

J. Safety at Sea and First Aid - Equipment

1. Bandages	1:5
2. Stretcher	1:20
3. Table	1:1
4. Life raft	1:1
5. Life jacket	1:1
6. Fire extinguisher	1:5

II. Fish Culture

1. Student microscope, compound	1:5
2. Glass slides	1:1
3. Research microscopes	1:20
4. Dissecting microscopes	1:20
5. Petri dish	1:5
6. Refractometer	1:20
7. pH meters	1:20
8. Oxygen meter	1:20
9. Secchi dish	1:10
10. Plankton net	1:5
11. Thermometer	1:5
12. Drying oven	1:20
13. Toledo balance 200 kg	1:10
14. Analytical balance	1:20
15. Hydrometer	1:20
16. Laboratory centrifuge	1:10
17. All-glass aquaria	1:5
18. Aerator (battery operated)	1:5
19. Pipette	1:5
20. test tubes	1:1
21. Beakers	1:3
22. Graduated cylinders	1:5
23. Plastic tubings (.1 m)	1:3
24. Glass desiccators	1:10
25. Soil sampler	1:5
26. Soil sieve	1:5
27. Bottom grab (dredge)	1
28. Water sampler	1:5
29. Meter stick	1:5
30. Plastic pails or basins	1:5
31. Plastic bags	1:5
32. Buri bags	1:5
33. Net enclosures	1:10
34. Seine nets	1:10

35. Gill nets	1:10
36. Banyeras	1:5
37. Digging blade	1:5
38. Bolo	1:1
39. Shovel	1:1
40. Scoop net	1:1
41. Weighing scale	1:5
42. Oxygen Tank	1:5
43. Paddle Wheel	
44. Algal tank (1-ton cap)	
45. Larval tank (3-ton cap)	
46. Post larval tank (6-ton cap)	
47. Water pump	
48. Submersible pump	
49. Hemacytometer	
50. Harvesting box (fry)	
51. Scoop nets	
52. Portable weighing scale (10 kg)	

III. Fish Preservation

Level 1 - Operator	Ratio
1. Refrigerator 12 cu.ft.	3
2. Toory smoke house with accessories	1:5
3. Portable weighing scale - 2.5 kg.	1:3
4. Toledo balance - 200 kg.	1
5. Steamer - 9 1/2 x 7 1/2 x 3 1/2 = 2 qt.	1
6. Fish thermometer	1.5
7. Salinometer	1.5
8. pH tester	1.5
9. Refractometer	1.5
10. Paring knife	1.5
11. Butcher knife	1.5
12. Kettles	1.10
13. Sauce pan with cover	1.5
14. Petri dish	1.5
15. Dilution bottles	1.10
16. Styrofoam boxes	1.10
17. Enamel tray	1.10
18. Microscope	3
19. Selective media	1:1
20. Standardized solutions	1:1
21. Silent cutter	1:5
22. Salting vat	1:10
23. Sausage making set	1
24. Incubator 35° & 45°C	1
25. Analytical balance	1
26. Colony counter	1
27. Auto clave	1
28. Electric meat grinder	1
29. Solar dryer	1
Level II - Craftsman	
1. Thermocouple	1:10
2. Kjeldahl apparatus	1:20
3. Soxhlet apparatus	1:20

4. Histamine analyzer	1:20
5. Condensing apparatus	1:20
6. Ohaus moisture meter	1:20
7. Water bath	1:20
8. Retort	1
9. Recorder	1
10. Food processor	
11. Diamond cutter	1:5
12. Grinding stone	1:5
13. Pliers	1:1
14. Adhesive	1:1
15. Oven	1:10
16. Baking utensils	1:10
17. Plastic sealer	1
18. Standardized solutions	1:1
19. Manually operated can sealer	1:10
20. Electrical can sealer	1:20
21. Vacuum gauge	1:5
22. Colander	1:5

Level III - Technician

1. Pilot canning plant	
2. Taste panel booth	
3. Freezer 7 (cubic ft.)	1:10
4. Cold storage (5-ton cap)	

Suggested Curriculum Framework for the New Fishery Technology
Education and Training

FISH CAPTURE

Level I
(Operator)

FIRST SEMESTER

SECOND SEMESTER

<u>SUBJECT</u>	<u>HRS./WEEK</u>	<u>CREDIT</u>	<u>SUBJECT</u>	<u>HRS./WEEK</u>	<u>CREDIT</u>
English I	3	3	Fishing Operation I	9(3-6)	5
Math I	3	3	Artificial Reef Design & Construction	8(2-6)	4
General Fisheries and Laws	3	3	Navigation and Seafanship I	9(3-6)	5
Aquatic Biology	9(3-6)	5	Boat and Engine Operation, Repair and Maintenance I	8(2-6)	4
Technical Drawing	3	3	Post-Harvest Handling	5(2-3)	3
Values Ed. I	1	1	M.S. 12		(1.5)
M.S. 11		(1.5)	P.E. 2		(1.0)
P.E. 1		(1.0)	Total	39 HRS.	21
Total	22 HRS.	18			

SUMMER

OJT 6 Weeks 240 HRS.

Level II
(Craftsman)

English II	3	3	Marine Ecology	3	3
Applied Chemistry	8(2-6)	4	Applied Chemistry II	8(2-6)	4
Fishing Operation II	9(3-6)	5	Oceanography	3	3
Navigation and Seafanship II	9(3-6)	5	Boat and Engine Operation, Repair and Maintenance II	9(3-6)	5
Values Ed. II	1	1	Fishery Business I	3	3
M.S. 21		(1.5)	M.S. 22		(1.5)
P.E. 3		(1.0)	P.E. 4		(1.0)
Total	38 HRS.	18	Total	26 HRS.	13

SUMMER

OJT 6 Weeks 240 HRS.

Level III
(Technician)

Physics	8(2-6)	4	On-the-Job-Training		
Fishery Business II	3	3	Duration - 5 months - - 6 Units		
Fishing Extension Education I	3	3	In any government or private Fishing Entities		
Fishing Operation III	9(3-6)	5			
Marine Resource Management	5(2-3)	3			
Total	28 HRS.	18			

Total no. of Units - - 99

FISH CULTURE

Level I
(Operator)

FIRST SEMESTER

<u>SUBJECT</u>	<u>HRS./WEEK</u>	<u>CREDIT</u>
English I	3	3
Math I	3	3
General Fisheries and Laws	3	3
Aquatic Biology	9(3-6)	5
Technical Drawing	3	3
Values Ed. I	1	1
M.S. 11		(1.5)
P.E. 1		(1.0)
Total	22 HRS.	18

SECOND SEMESTER

<u>SUBJECT</u>	<u>HRS./WEEK</u>	<u>CREDIT</u>
Mariculture	8(2-6)	4
Freshwater Fish Culture	9(3-6)	5
Brackishwater Fish Culture	9(3-6)	5
Post-Harvest Handling	5(2-3)	3
Fishery Business I	3	3
M.S. 12		(1.5)
P.E. 2		(1.0)
Total	34 HRS.	20

SUMMER

OJT Field Work (Training) 6 Weeks 240 HRS.

Level II
(Craftsman)

English II	3	3
Physics	8(2-6)	4
Applied Chemistry	8(2-6)	4
Fish Culture Site Management	9(3-6)	5
Values Ed. II	1	1
M.S. 21		(1.5)
P.E. 3		(1.0)
Total	29 HRS.	17

Pests and Para- sites	8(2-6)	4
Water Management	8(2-6)	4
Feeds and Feeding Management	8(2-6)	4
Fish Culture Faci- lities Desing & Construction	9(3-6)	5
M.S. 22		(1.5)
P.E. 4		(1.0)
Total	33 HRS.	17

SUMMER

OJT 6 Weeks 240 HRS.

Level III
(Technician)

Aquaculture Busi- ness Enterprise	9(3-6)	5
Aquaculture Exten- sion	9(3-6)	5
Fish Seed Production	9(3-6)	5
Elective	3	3
Total	30 HRS.	18

On-the-Job-Training
Duration - 5 months - - 6 Units
In any government or private
Fishing Entities

Total no. of Units - - 96

FISH PRESERRATION

Level I
(Operator)

FIRST SEMESTER

SECOND SEMESTER

<u>SUBJECT</u>	<u>HRS./WEEK</u>	<u>CREDIT</u>	<u>SUBJECT</u>	<u>HRS./WEEK</u>	<u>CREDIT</u>
English I	3	3	Technical		
Math	3	3	Drawing	3	3
Applied Chemistry	8(2-6)	4	Fish Micro-		
Gen. Fisheries and			biology	9(3-6)	5
Laws	3	3	Plant Sanitation		
Aquatic Biology	9(3-6)	5	& Safety	3	3
Values Ed. I	1	1	Fish Curing	9(3-6)	5
M.S. 11		(1.5)	Fish Handling &		
P.E. 1		(1.0)	Refrigeration	9(3-5)	5
			M.S. 12		(1.5)
			P.E. 2		(1.0)
Total	27 HRS.	19	Total	33 HRS.	21

SUMMER

OJT (Suggested concentration - Fish Curing) 6 Weeks 240 HRS.

Level II
(Craftsman)

English II	3	3	Fish Chemistry	9(3-5)	5
Physios	8(2-6)	4	Minor Fishery		
Fisheries Economics	3	3	Products	9(3-6)	5
Canning	9(3-6)	5	Fisheries Exten-		
Machineries and			tion Ed. I	3	3
Appliances	3	3	Packaging	3	3
Values Ed. II	1	1	Fishery Business I	3	3
M.S. 21		(1.5)	M.S. 22		(1.5)
P.E. 3		(1.0)	P.E. 4		(1.0)
Total	27 HRS.	19	Total	27 HRS.	19

SUMMER

OJT Canning and Extention Work 6 Weeks 240 Hrs.

Level III
(Technician)

Product Analysis			On-the-Job-Training		
Standardization	9(3-6)	5	Duration - 5 months - - 6 Units		
Product Development	9(3-6)	5	In any government or private		
Fisheries Extention			Fishing Entities (Immersion in		
Education II	3	3	laboratory conditions)		
Elective	3	3			
Total	24 HRS.	16			

Total no. of Units - - 30